3.17 CUMULATIVE IMPACTS EVALUATION

3.17.1 Introduction to Cumulative Impacts

This section describes the potential cumulative impacts of the No Project, Modal, and High-Speed Train (HST) Alternatives in the study areas of the five regions analyzed in this Program EIR/EIS. Cumulative impacts can result from individually minor but collectively significant impacts of all projects/actions in the study area taking place over a period of time. Cumulative impacts include direct and indirect effects of proposed projects/actions that result from incremental impacts of the proposed project/action added to the impacts of other past, present, and reasonably foreseeable projects/actions, regardless of what agency or person undertakes such projects or actions (40 C.F.R. § 1508.8; 14 C.C.R. § 15130).

The term *cumulative impact* refers to "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts" (CEQA Guidelines § 15355). A cumulative impact can result from either of the following.

- The combination of two or more individually significant impacts.
- The combination of two or more impacts that are individually less than significant but constitute a significant change in the environment when considered together.

To analyze a proposed project's contribution to cumulative impacts, a lead agency must identify reasonably foreseeable projects/actions in the vicinity of the proposed project, summarize their effects, identify the contribution of the proposed project to cumulative impacts in the project region, and recommend feasible options for mitigating or avoiding the project's contribution to any significant cumulative effects (CEQA Guidelines § 15130[b][3]).

There are two approaches to identifying related past, present, and future projects and their impacts: the "list" approach, where projects are identified on an individual basis, and the "projection" approach, where the analysis of cumulative impacts is based on a summary of projections in an adopted general plan or related planning document. In this Program EIS/EIR, both approaches have been used. For this Program EIR/EIS, information was used from existing environmental documents completed for regional transportation plans that include the highway and airport improvement projects approved for future implementation under the No Project Alternative and projections made in the state implementation plan for air quality. The list of these projects is included in Chapter 2, *Alternatives*, Tables 2.5-1 and 2.5-2, and in the air quality section (Section 3.3) of Chapter 3. To capture potential indirect cumulative effects, this cumulative impacts section also addresses highway improvements and transit projects within the study area and within the same areas of potential effect evaluated for the specific corridors included as part of the No Project, Modal, and HST Alternative alignments. The projects considered herein are primarily transportation related (e.g., highway and rail transit improvements) and are based on planned improvements that are included as part of the fiscally unconstrained (not programmed at present) portion of the regional transportation plans for each region in the study area. Because of the population growth potential and the proximity to study corridors and stations analyzed in this environmental document, a few other projects are also considered as part of the cumulative analysis, including major developments like the University of California (UC) at Merced campus. Appendix 3.17-A lists the projects identified for consideration in this cumulative impact analysis.

Potential cumulative impacts are discussed separately for each environmental topic as appropriate for a program-level environmental analysis.

3.17.2 Cumulative Impacts Analysis

The following analysis describes the potential for the Modal and HST Alternatives to contribute to cumulative impacts under each environmental topic. The environmental topics are discussed herein in the same order as they appear in Chapter 3. The No Project Alternative is mentioned only when there are potential cumulative impacts that would result from not proceeding with the Modal or HST Alternatives (examples: air quality, energy, traffic congestion). Where the No Project Alternative would not result in impacts by 2020, or where the existing conditions would not change (or conditions were considered too speculative to feasibly predict for future years), the No Project Alternative is not addressed.

A. TRAFFIC AND CIRCULATION AND TRAVEL CONDITIONS

As stated in the purpose and need chapter of this Program EIR/EIS (Chapter 1), intercity travel in California is expected to grow from 155 million trips to more than 209 million trips in the next 20 years, with an estimated 58% of these trips made by automobile. More than half of the 65 highway segments analyzed in this study would operate at unacceptable conditions (level of service F) under the No Project Alternative. The expected increase in the number of autos on the highways by 2020 would also result in significant travel delays and congestion under the No Project Alternative, which would have significant potential impacts on the state's economy and quality of life.

The Modal Alternative would improve the existing highways and airports beyond what is approved and funded under the No Project Alternative; however, congestion and travel delays would worsen on surface streets leading to and from the intercity highways and airports, contributing to cumulative traffic impacts.

Implementation of the proposed HST Alternative would result in about 38.5 million fewer long-distance passenger trips by automobile annually than would be expected with the Modal Alternative improvements, as discussed in Section 3.2, *Travel Conditions*. This outcome would benefit intercity highways and would potentially reduce travel delays on the affected highways and on surface streets leading to and from intercity highways. Localized traffic conditions around some HST stations would experience a decrease in level of service and some added delays, and transit lines serving the stations areas would experience increases in passengers during peak hours. Although these potential effects could contribute to localized cumulative impacts, they could be mitigated, and any potential contribution to cumulative impacts could be minimized. Site-specific traffic analysis would be part of subsequent evaluation of local impacts around station locations if a decision were made to pursue the HST Alternative.

B. AIR QUALITY

The analysis of air quality considers emissions projected by the California Air Resources Board (CARB) for eight criteria pollutants (CO, SO_x, HC, NO_x, O_3, PM10, PM2.5, and Pb) in the six air basins potentially affected, and therefore includes all reasonably foreseeable project/actions and population growth as part of the No Project Alternative. The analysis is structured to estimate the potential impacts on the air quality on the local and regional levels in six air basins directly affected by the project alternatives. These basins are Sacramento Valley, San Francisco Bay Area, San Joaquin Valley, Mojave Desert, South Coast, and San Diego County. Overall, the potential impacts of either the Modal or HST Alternatives, in combination with the air quality impacts of other highway projects or airport improvements identified for this cumulative impact analysis (Appendix 3.17-A) and those projects considered in the state implementation plan for air quality could contribute to cumulative air quality impacts within the six-basin study area.

The Modal Alternative would add about 2,970 lane mi (4,780 lane km) to existing highways. The result of the additional lane miles would be an estimated increase of 1.1% of highway vehicle miles

traveled (VMT), which is predicted to increase the amount of regional pollutants generated by 1.1% over the No Project Alternative. This outcome would equate to 3,190 tons (2,894 metric tons) of CO per day; 629 tons (571 metric tons) per day of NO_x, and 1.4 million tons (1.3 million metric tons) per day of CO_2. The Modal Alternative would have a high potential impact on air quality. The ranking of high, medium, or low as discussed in Section 3.3 is based on the magnitude of the emission changes compared to the No Project Alternative emission budget and general conformity threshold levels for non-attainment and maintenance areas. Exceeding 10% of a non-attainment or maintenance inventory for a pollutant would be regionally significant. Potential localized air quality impacts associated with construction-generated dust (particulates or PM_{10}) are also expected. When combined with the potential impacts of other highway or airport or major development projects like the UC campus in Merced in other corridors and areas within the six air basins, the Modal Alternative would contribute to potentially significant cumulative air quality impacts on both the regional and local levels.

It is estimated that the proposed HST Alternative would be able to accommodate 68 million people annually for intercity trips, according to the sensitivity analysis conducted by Charles River Associates and discussed in depth in the air quality section. Intercity passengers using this alternative would otherwise use the roadways and airports, and the result is a potential 1.8% reduction in VMT on the state highway system, and a reduction in emissions from the reduced number of flights (42.7 million auto trips and 25.3 million air trips would shift to HST annually, according to the sensitivity analysis). Overall, pollutants would decrease in all air basins analyzed compared to the No Project Alternative baseline: CO 24.2%, PM10 0.62%, NO_x 4.1%, and total organic gases 3.1%. Therefore, the HST Alternative would result in an air quality benefit. The benefit could increase if the HST ridership increased beyond the levels assumed in this document.

C. NOISE AND VIBRATION

Noise, particularly in growing urban areas and along highway corridors, will continue to increase as population grows and use of highways and airports increases.

Implementation of the Modal Alternative would result in high potential noise impacts along approximately 210 mi (338 km) of highway alignment and expansion of existing airport perimeters. When combined with the noise impacts associated with other projects, the Modal Alternative could contribute to localized cumulative noise and vibration impacts, primarily in urban areas with a higher density of receptors.

Implementation of the proposed HST Alternative would result in high potential noise impacts along approximately 8 mi to 133 mi (13 km to 214 km) of alignment, depending on the alignment options selected. These potential impacts, when combined with the potential noise impacts of other highway, roadway, and transit expansion projects in the region, would contribute to localized potential cumulative noise impacts during construction and operation.

D. ENERGY

Continued dependence on automobiles and air travel for intercity trips would result in annual consumption of an estimated 24.3 million barrels of oil per year for the No Project Alternative. The Modal Alternative would result in consumption of an additional 0.2 million barrels per year (24.5 million barrels total). Both alternatives would contribute to cumulative energy impacts when considered with other highway and airport projects in the state, and with large development projects that would consume energy (like the new UC Merced campus).

The HST Alternative would reduce energy consumption by an estimated 5.3 million barrels of oil annually (a 22% savings compared to the No Project Alternative). This outcome compares with an

annual increase under the Modal Alternative of 0.2 million barrels over the No Project Alternative energy use in 2020. This conservative estimate is based on use of small trains that could be expanded to carry more passengers; the potential energy benefits could be substantially higher if train capacity were increased. The proposed HST Alternative would have a beneficial impact on energy consumption in the state.

E. ELECTROMAGNETIC FIELDS AND ELECTROMAGNETIC INTERFERENCE

Electromagnetic fields (EMFs) exist in the environment both naturally and as a result of human activities. By the year 2020, EMFs along existing roadways and railroad rights-of-way would probably be affected by technological developments and by increases in total energy consumption. For example, general EMF levels along highways may be cumulatively increased by advanced automotive technologies such as collision avoidance systems and automatic vehicle guidance systems, if such technologies are implemented by 2020. Improvements to airports may also increase environmental EMFs because of increased use of radar, radio communications, and instrument landing systems. Based on available information, these changes are not likely to cause significant changes in EMF levels, increased human exposures to EMFs, or electro-magnetic interference (EMI) in the environment; therefore, significant cumulative impacts from EMFs or EMIs associated with the Modal Alternative and other proposed projects within the study area are not anticipated.

The HST system would traverse a range of geographic and land use typologies and could result in potential EMF exposure in urban, suburban, rural, agricultural, and industrial areas. The various components of the HST infrastructure and the trains themselves would be sources of EMFs at both extremely low frequency (ELF) and radiofrequency (RF). It is likely that some additional potential for human exposure to EMFs and EMI would occur with the HST Alternative in combination with other proposed projects (potential activities include transmission lines and other electric rail systems); however, although the HST Alternative could contribute to cumulative EMF and EMI impacts, significant increases in EMF and EMI levels are not anticipated from the HST Alternative because these impacts could be minimized by design choices (tunnel, elevated track, or physical barriers between track and receptor) or mitigated to a level of less than significant through shielding.

F. LAND USE AND PLANNING, COMMUNITIES AND NEIGHBORHOODS, PROPERTY, AND ENVIRONMENTAL JUSTICE

Under the Modal Alternative, the expansion of the existing highway system would contribute to the historic trend of impacts from land use/urban sprawl related to population growth and impacts on land made accessible by automobile. The highway improvement options would not support local and regional planning objectives that promote transit-oriented higher-density development around transit nodes as the key to planned in-fill development for more efficient use of land and resources. Combined with other highway corridor projects in the five regions, the Modal Alternative would contribute to the promotion of sprawl along improved highways. Additionally, 309 mi (497 km) of highway alignment (20% of total highway alignment length) would affect potentially sensitive residential land uses subject to significant impacts, and 289 mi (465 km) of alignment (19% of total improved highway alignment distance) would affect medium-sensitivity land uses. When combined with the property impacts of other highway expansion projects, the Modal Alternative would contribute to a cumulative impact on residential neighborhoods, parks, schools, open space, and established local communities.

The proposed HST Alternative would contribute to potential cumulative impacts associated with community and neighborhood cohesion and property loss. Some alignment options of the HST Alternative, such as the southern mountain crossings through the Antelope Valley area, would create new transportation corridors and potentially result in localized impacts on community cohesion. Combined with other transit (light rail and commuter rail) and roadway projects considered for this

cumulative impact analysis, as listed in Appendix 3.17-A, these localized impacts would contribute to cumulative community/neighborhood impacts. Under the HST Alternative, between 53 mi and 88 mi (85 km and 142 km) of rail alignment and station locations (7% to 11% of total alignment distance) would affect high-impact land uses (new corridor in residential areas and parks), and between 92 mi and 145 mi (148 km and 233 km) of track alignment and station locations (11% to 17% of alignment distance) would affect medium impact land uses (widening existing corridors in residential and commercial business areas). These impacts, in combination with other transit extension and roadway projects, would contribute to potential cumulative impacts on various property types, neighborhoods, and communities.

G. AGRICULTURAL LANDS

According to 2001 records (American Farmlands Trust 2003; California Department of Food and Agriculture 2002), California has approximately 27.7 million ac (11.2 million ha) of land in agricultural use, representing approximately 4% of the nation's total farmland operations. Six of the top ten California agricultural counties are located in the Central Valley. According to the 2001 estimate, in the decade between 1988 and 1998, approximately 497,000 ac (201,129 ha) of farmland was converted to non-agricultural use due to urbanization. Based on the present pace of farmland conversion to non-agricultural use within the state, it is anticipated that by 2020 under the No Project Alternative, the state may have lost nearly 845,000 ac (341,960 ha) of farmland to urban development. This amount would represent a reduction of approximately 3% in the state's 27.7 million ac (11.2 million ha) of farmland.

For the Modal Alternative, potential impacts on farmland beyond the No Project Alternative impacts would include approximately 613 ac (248 ha) of prime farmland, 90 ac (36 ha) of unique farmland, 242 ac (98 ha) of farmland of statewide importance, and 173 ac (70 ha) of farmlands of local importance. The total agricultural land area impacted under the Modal Alternative would be approximately 1,118 ac (452 ha). This potential reduction of farmland, when combined with the conversion of farmland associated with the No Project Alternative and with the other projects considered under the cumulative analysis, would result in an overall potential cumulative impact on agricultural land throughout the state.[1]

Potential direct impacts on farmland from the proposed HST Alternative would vary based on the alignment options selected. The ranges of potential impacts would be 1,514 ac (613 ha) to 1,907 ac (772 ha) of prime farmland, 200 ac (81 ha) to 545 ac (221 ha) of unique farmland, 814 ac (329 ha) to 1,077 ac (436 ha) of farmland of statewide importance, and 141 ac (57 ha) to 331 ac (134 ha) of farmlands of local importance, according to the land designations in the Farmland Mapping and Monitoring Program (FMMP). The total potential impact on agricultural lands throughout the study area would vary between 2,559 ac (1,036 ha) and 3,850 ac (1,558 ha), depending on the alignment options. The combination of the potential HST Alternative impacts on agricultural lands and the potential impacts from other projects would result in cumulative impacts on agricultural lands throughout the state.

Conversion of farmland for purposes of the Modal or HST Alternative may be viewed in a broader context by comparing its potential extent to the total projected conversion of farmland to non-agricultural use due to population growth and urbanization in the state: Of the nearly 845,000 ac (341,960 ha) projected for conversion to non-agricultural use by 2020 (California Department of Conservation 2000), the Modal or HST Alternative would each represent less than 0.5% of additional farmland conversion.

[1] This analysis is based on the use of FMMP databases (California Department of Conservation, 2000) and does not include field verification of the listings.

H. AESTHETICS AND VISUAL RESOURCES

The aesthetic and visual quality analysis focused on potential impacts on visual resources (particularly scenic resources, areas of historic interest, natural open space areas, and significant ecological areas) along the proposed corridors for the Modal and HST Alternatives and around potential HST station sites. Both the Modal and HST Alternatives would impact existing visual quality and would contribute to potential cumulative impacts on aesthetics and visual quality throughout the study area for visual resources (0.25 mi [0.40 km] from the centerline of proposed alternative corridors and around stations and airports).

The Modal Alternative, when combined with other projects along other corridors in the same five regions, would likely contribute to cumulative impacts on visual resources throughout the study area. The Modal Alternative would contribute to temporary cumulative impacts on visual quality from highway construction activities such as construction equipment and materials in adjacent staging areas, construction-related signage, k-rails,[2] and night lighting. The Modal Alternative, in combination with multiple projects in other highway and rail corridors in the region, would add an estimated 2,970 lane mi (4,780 lane km) to intercity highways statewide, which would require more than 10 years to complete. The construction activities (e.g., earth disturbance, removal of vegetation, dust), construction equipment (e.g., cranes, bulldozers, trucks), and materials staging areas would be highly visible to motorists and adjacent residents and businesses over a prolonged period, and would detract from landscape features along the corridors.

The Modal Alternative would also have long-term effects on visual resources from the additional pavement and added width of highway structures (interchanges, ramps, bridges), as well as noise barriers, retaining walls, and open cuts in steep terrain. Dominant landscape characteristics within the study area would be changed along extensive stretches of highway that traverse a variety of landscape types. These landscape changes may not be considered significant individually because they are additions to existing infrastructure. When the alterations are combined with projects in other corridors in the five regions, however, the Modal Alternative could contribute to substantial cumulative visual effects over the next 17 years, by which time the improvements are expected to be completed and in operation. In the natural open space and rural landscapes, widening a narrow two- or four-lane highway would have direct visual impacts and would contribute to cumulative visual impacts on the line, form, texture, and color of the highway. Expanding runways for airports would enlarge areas of visual effect and increase the presence of airports in the landscape. Within the suburban and urban areas, the Modal Alternative could alter the existing landscape and thereby contribute to potential cumulative visual impacts from expanded airports, widened highways, elevated portions of highway, and added noise walls.

The proposed HST Alternative would also contribute to both short- and long-term potential cumulative impacts on visual resources. Construction of the system would have short-term potential impacts on visual resources, similar to those described above for the Modal Alternative. Construction equipment, staging areas with construction materials, signage, and night lighting would be visible from adjacent properties and roadways during the construction period. The number of years such disruptions would continue would be similar for the Modal and HST Alternatives (i.e., about 10 to 17 years system-wide; however, potentially a few months to 2 years for most local areas). Thus the HST Alternative could contribute to construction-related cumulative impacts on visual resources.

Long-term visual changes would result from the introduction of 700 mi (1,127 km) to 750 mi (1,207 km) of a new transportation system that would be visible along many major highways and rail corridors connecting the metropolitan areas of the state. The track, catenary, fencing, soundwalls (where included), elevated guideway (where included), and trains themselves would introduce a

[2] *K-rails* are concrete barriers used to separate travel lanes from construction areas.

linear element into the landscape that would contribute to potential cumulative visual impacts when considered with the strong linear element of the existing highway, rail facilities, and transmission lines that the HST would parallel. The significance of the visual change would vary by location, depending on the sensitivity of the landscape and the compatibility with existing landscape features.

In a number of locations in the Los Angeles to San Diego via Orange County region, the HST Alternative would present opportunities to improve the existing visual environment with alignment and/or construction options that would either place existing and new rail infrastructure in a tunnel or covered trench, or remove existing rail infrastructure from areas of high scenic value and relocate it in tunnels. Thus, the HST Alternative would contribute to a beneficial cumulative effect when combined with other planned improvements along the coastal landscape.

I. PUBLIC UTILITIES

Construction of multiple linear facilities (e.g., highway expansions, rail extensions, pipelines, transmission lines) in a region would potentially contribute to cumulative impacts on public utilities and future land use opportunities because of right-of-way needs and property restrictions associated with these types of improvements. These multiple facilities would place constraints on future development, including future development of public utilities. The Modal Alternative would not result in construction of new linear facilities and therefore would not contribute to cumulative impacts on public utilities. If the proposed HST Alternative moved to the next stage of environmental review, emphasis would be placed on detailed alignment design to avoid potential contribution to cumulative impacts from linear facilities on land use opportunities and to minimize conflicts with existing major fixed public utilities and supporting infrastructure facilities.

J. HAZARDOUS MATERIALS AND WASTES

Neither improvements to highways and airports under the Modal Alternative nor implementation of the proposed HST Alternative would directly or indirectly generate hazardous materials or wastes. Any hazardous wastes encountered through ground-disturbing activities during construction of either alternative would be handled and disposed of in accordance with regulatory requirements. Therefore, no cumulative hazardous material impacts would result from either alternative in combination with other projects.

K. CULTURAL AND PALEONTOLOGICAL RESOURCES

The Modal Alternative has the potential to result in impacts on archaeological resources, historic structures, and paleontological resources in the five regions analyzed. Archaeological resources and historical structures would potentially be impacted by airport expansion and the expansion of existing highway rights-of-way necessary for additional lanes under the Modal Alternative. The greatest potential for impacts is on paleontological resources because there are many areas where existing highways cross formations with high paleontological sensitivity, and any construction in these areas could disrupt these resources. Regarding historic structures, although potential impacts could be mitigated for individual projects, the cumulative effects of projects along multiple corridors in a region over time could potentially affect the integrity of a historical district. Therefore, the Modal Alternative, combined with other proposed projects/actions in the five regions analyzed (Appendix 3.17-A), would likely contribute to potential cumulative impacts on paleontological resources.

The proposed HST Alternative would also contribute to potential cumulative impacts on archaeological resources, historical structures, and paleontological resources in the five regions analyzed, although fewer corridors would be affected overall. Potential impacts would likely occur in areas that cross formations with paleontological sensitivity and in areas where the HST Alternative alignments use existing rail corridors, because these corridors tend to be surrounded by historical structures and districts. In addition, like the Modal Alternative, the HST Alternative could contribute

to potential cumulative impacts on historic districts combined with other projects over time. Subsequent field studies to verify the location of cultural resources would offer opportunities to avoid or minimize direct impacts on resources.

L. GEOLOGY AND SOILS

Both the Modal and HST Alternatives could impact slope stability in various proposed locations of cut and fill. Some construction activities, such as placing a building or fill material on top of a slope or performing additional cuts at the toe of a slope, can decrease the stability of the slope. These activities, when combined with similar activities from other projects in the region, could potentially result in cumulative impacts on slope stability in areas susceptible to slope failure.

Pumping or construction dewatering associated with the Modal and HST Alternatives in segments where tunneling or extensive earthwork would be undertaken would potentially impact the ground surface and could result in subsidence at some locations. This could contribute to cumulative impacts if other projects under construction in the area also needed to dewater from the same drainage basin.

M. HYDROLOGY AND WATER RESOURCES

Improvements to transportation infrastructure associated with the Modal Alternative (primarily additional highway lanes and airport runways) would significantly encroach into sensitive hydrologic resources, including approximately 5,500 ac (2,226 ha) of floodplains, approximately 2.3 million linear ft (0.7 million linear m) of streams, approximately 726 ac (294 ha) of lakes, and approximately 32,000 ac (12,950 ha) of groundwater areas. New infrastructure associated with the Modal Alternative would add approximately 4,640 total ac (1,878 total ha) of impervious surface within the study area (100 ft [30 m] from the centerline of proposed alternative corridors and direct footprint of facilities, including corridors and facilities that would undergo upgrades/expansions), which would decrease groundwater recharge and increase stormwater runoff and flooding potential. When combined with other proposed highway, transit, and water projects in other corridors within the same regions, the implementation of the Modal Alternative would contribute to potential cumulative impacts on hydrologic resources.

The proposed HST Alternative would also contribute to potential cumulative impacts on hydrologic resources but to a lesser extent than the Modal Alternative (up to 3,873 ac [1,567 ha] of floodplains, 760,219 linear ft [231,714 linear m] of streams, 256 ac [104 ha] of lakes, and 17,113 ac [6,925 ha] of groundwater). The amount of impervious surface associated with the HST Alternative would be much less than that of the Modal Alternative because much of the HST facilities would consist of permeable track-fill (an estimated 30% of the alignment would be elevated or in tunnel). Design characteristics such as a relatively narrow alignment width and fewer columns required to support HST structures than modal structures would result in fewer hydrologic impacts. Depending on specific designs, the improvements under the HST Alternative could have fewer impacts on floodplain and surface water resources than the Modal Alternative.

N. BIOLOGICAL RESOURCES AND WETLANDS

The analysis of potential impacts on biological resources and wetlands includes sensitive plant communities, sensitive habitats of concern, special-status species, marine and anadromous fish habitat, riparian corridors, wildlife habitats, wildlife movement corridors, jurisdictional wetlands, and waters of the U.S. that would require a permit and Section 404b(1) analysis. The additional land required and the linear features added under either the Modal or HST Alternative would contribute to the potential for cumulative impacts on biological resources and wetlands throughout the study area (1,000 ft [305 m] on either side of alignment centerlines and around stations in urbanized areas, 0.25 mi [0.40 km] on either side of alignment centerlines and around stations in undeveloped areas, and

0.50 mi [0.81 km] on either side of alignment centerlines and around stations in sensitive areas) in the five regions evaluated.

The Modal Alternative would have potential impacts on sensitive biological resources and wetland habitats. The additional right-of-way, added highway lanes, and widening of bridges and overpasses associated with the Modal Alternative would affect approximately 77,000 ac (31,161 ha) of sensitive vegetation, 5.3 million linear ft (1.6 million linear m) of non-wetland jurisdictional waters, 23,000 ac (9,308 ha) of wetlands, and 321 special-status species throughout the study area. Additionally, there would be potential impacts on existing wildlife movement corridors and marine/anadromous fish resources. Therefore, when combined with the potential impacts of other highway, water, and conventional rail projects in the five regions, the Modal Alternative would contribute to potential cumulative impacts on these same resources.

Similar to the Modal Alternative, the HST Alternative would potentially have impacts on sensitive biological resources and wetlands and would contribute to potential cumulative impacts on these resources when combined with other foreseeable projects (Appendix 3.17-A) in the five-region study area. Portions of the HST Alternative would use existing rail alignments and would therefore not result in direct disturbance of sensitive habitats. The potential for indirect noise effects on biological resources is addressed in Section 3.4, *Noise and Vibration*. Although there is a potential for cumulative impacts on biological resources from increased noise from the collected projects in the area, the information for assessing this potential additive effect is not considered at this program level of analysis and would be addressed when site-specific analysis is completed in a subsequent phase of evaluation. The additional right-of-way associated with the proposed HST Alternative would potentially affect approximately 9,773 ac (3,955 ha) to 17,619 ac (7,130 ha) of sensitive vegetation, 783,223 linear ft (238,726 linear m) to 1.2 million linear ft (365,760 linear m) of non-wetland jurisdictional waters, 3,996 ac (1,617 ha) to 18,356 ac (7,428 ha) of wetlands, and 279 to 350 special-status species throughout the study area. Wildlife movement corridors may also be affected where the HST alignment would not be in an existing rail or highway corridor and would traverse a natural area (e.g., Diablo Range in the Bay Area to Merced region).

The HST Alternative would generally be located within or adjacent to existing transportation corridors or would be in tunnel or elevated through mountain passes and sensitive habitat areas. During project-level environmental review, field studies would be conducted to verify the location, in relation to the HST alignments, of sensitive habitat, wildlife movement corridors, and wetlands. These studies would provide further opportunities to minimize and avoid potential impacts on biological resources through changes to the alignment plan and profile in sensitive areas. For example, the inclusion of design features such as elevated track structures over drainages and wetland areas and wildlife movement corridors would minimize potential impacts to wildlife and sensitive species. However, when combined with the potential impacts of other highway, water, and conventional rail projects in the five regions, the HST Alternative would contribute to potential cumulative impacts on biological resources.

O. SECTION 4(f) AND 6(f) RESOURCES (PUBLIC PARKS AND RECREATIONAL RESOURCES)

The expansion of existing highway and airport networks associated with the Modal Alternative would potentially impact approximately 147 various types of Section 4(f) and 6(f) resources (i.e., parkland and recreational resources). When combined with the impacts of other highway and transit expansion projects in the region, the potential impacts of the Modal Alternative would contribute to potential cumulative impacts on parklands and recreational resources throughout the study area.

The proposed HST Alternative would also contribute to the cumulative impact on parkland resources. The impacts on parkland resources from the HST Alternative would be less extensive than the Modal Alternative, since it is possible to plan the HST alignment, stations, and other facilities with the intent

to avoid or minimize potential effects by routing the train around, above, or below an identified resource. Depending on the system of alignment options selected, the HST Alternative could result in impacts on 58 to 93 parkland resources. During project-level environmental review, field studies would offer the opportunity to avoid or minimize direct or indirect impacts on parklands by making adjustments in the alignment plan or profile.